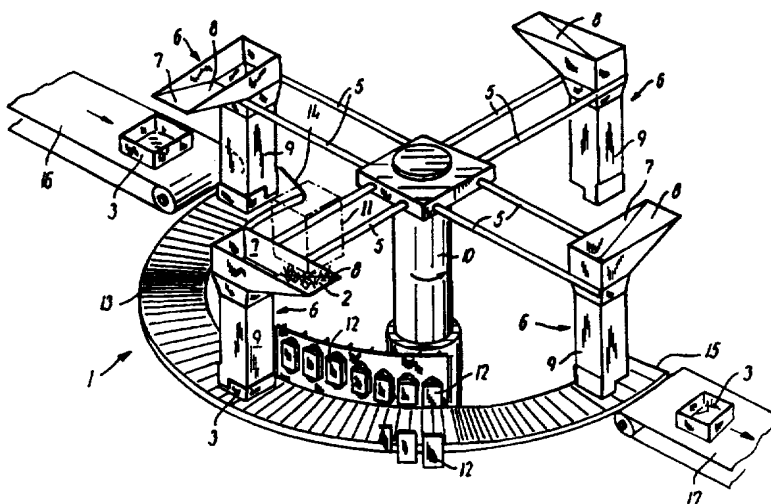




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(54) Title: A PACKAGING MACHINE AND A METHOD FOR PACKAGING UNITS IN PORTIONS



## (57) Abstract

The present invention relates to a packaging machine (1) for the packaging of batches of individual components (2) in a packaging (3). The packaging (1) comprises a number of transfer devices (6) which each comprises an inlet (7) arranged for receiving a batch of individual components (2) from a batch dispenser, and an outlet (9) arranged for transferring the batch to a packaging (3) positioned at the outlet (9). The packaging machine (1) further comprises means for advancing each of the transfer devices (6) synchronously with the packagings (3) past a filling station (11) where the components (2) are introduced into the transfer device (6) from the batch dispenser, and along a travel path (13) where the components (2) are transferred from the transfer device (6) to the packaging (3). Hereby a packaging machine (1) is provided wherein the transfer devices (6) are advanced synchronously with the packaging (3) to be filled with components (2). Thus, it is not necessary to stop the conveyor when the packagings (3) are to be filled. Hereby a packaging machine (1) is provided where the packagings (3) are advanced evenly on the conveyor. The invention also relates to a method of packaging batches of individual components (2) in a packaging (3).

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A packaging machine and a method for packaging units in portions.

Technical field

5 The present invention relates to a packaging machine for packaging batches of individual components in a packaging, said packaging machine comprising a number of transfer devices, each of which having an inlet intended for receiving a batch of individual components from a  
10 dispenser, and an outlet arranged for conveying the batch to a packaging positioned at the outlet.

The invention further relates to a method of packaging batches of individual components in a packaging, wherein  
15 a batch of components is conveyed through an inlet in a transfer device, said inlet being intended for receiving a batch of individual components from a batch dispenser, whereupon the components are conveyed through the transfer device and out through an outlet arranged for  
20 transferring the batch to a packaging positioned at the outlet.

Most proximate prior art

25 Packaging machines of the type described above are known. These prior art packaging machines are used i.a. for packaging batches of nails or screws in a packaging.

Often, the batches arrive at the packaging machine from  
30 several separate containers which cooperate with e.g. industrial weighing or measuring equipment. This weighing or measuring equipment is arranged for very quick batch dispensing of a correctly weighed out or measured batch of individual components e.g. by opening of a hatch in  
35 the container bottom. The entire batch of individual components is subsequently transferred all at once via

the transfer devices of the packaging machine to the packaging which is advanced on a conveyor below the outlet of the transfer devices.

5 Use of the above-identified apparatuses presupposes that the packaging is kept still while the transfer of components to the packaging is carried out, since in practice the transfer is not instantaneous. Therefore, a portion of the individual components will miss the  
10 packaging if this is not kept still during the transfer. Thus, it is necessary to stop the conveyor each time components are to be transferred to the packaging. Hereby the conveyor is advanced intermittently which is inconvenient since the conveyor has to be accelerated and  
15 decelerated all the time. Moreover, this acceleration and deceleration restrict the advancing rate of the conveyor and thereby the production capacity is also restricted. Moreover the acceleration and the deceleration may cause packaging units to tip, be shifted or turned  
20 unintentionally.

It is a further drawback of the known packaging machines that the batch of individual components is transferred very quickly and vigorously to the packaging which may  
25 cause damage to the packaging as well as to the individual components.

#### Object

30 It is the object of the invention to provide a packaging machine of the type described initially wherein the packagings are transferred evenly on the conveyor without necessitating acceleration or deceleration of the conveyor each time a packaging unit is to be filled with  
35 components.

Novel aspects of the machine

The packaging machine according to the invention is characterised in that the packaging machine comprises means for conveying each of the transfer devices synchronously with the packagings past a filling station where the components are fed to the transfer device from the dispenser and along a travel path where the components are transferred from the transfer device to the packaging.

Advantages

Hereby a packaging machine is achieved where the transfer devices are advanced synchronously with the packaging to be filled with components. Thus, it is not necessary to stop the conveyor when the packagings are to be filled. Hereby a packaging machine is provided where the packagings are advanced evenly on the conveyor.

Mode of operation

In use, a batch of individual components arrive all at once at the packaging machine from several separate containers which may cooperate with e.g. industrial weighing or measuring equipment. The entire batch is subsequently conveyed down through the inlet of the transfer device, through the transfer device, out through the outlet of the transfer device and down into the packagings which are located at the outlet of the transfer devices and advanced on a conveyor. Simultaneously the transfer devices are advanced synchronously with the packagings thereby causing the packagings to be at the outlet of the transfer devices at all times during the transfer operation.

Advantages associated with preferred embodiments

Convenient embodiments of the invention will appear from claims 2 through 10.

5

According to claim 2 the transfer devices are so constructed that the components of a batch introduced into the respective inlets of the transfer devices are separated and are, individually or a few at a time, transferred to the packaging during the outlet along at least a portion of said travel path. Hereby the individual components are gently transferred to the packagings thereby avoiding any damage to the packaging or the components.

15

According to a particularly preferred embodiment, a chute is provided between the respective inlets and outlets of the transfer devices which is downwardly tapering towards the outlet. Hereby a very simple device is provided for separating the components of a batch.

20

According to a further convenient embodiment of the packaging machine, a magnetic field is provided along a portion of the travel path of the packaging and transversally to said travel path. The magnetic field is arranged for paralleling the components whereby they are packed in a more compact and uniform manner in the packagings.

25

For instance, the magnetic field may be provided via a number of magnets arranged on both sides of the travel path of the packaging. Hereby a simple paralleling of the components is provided.

30

Advantageously, the individual magnets may be displaced downwards relative to the surface of the travel path of

35

the packagings and arranged next to each other seen in the direction of the packagings' travel path. Hereby a more compact packaging of the components is achieved thereby allowing the dimensions of the packagings to be  
5 reduced compared to the situation where the magnets are not displaced.

The travel path of the packaging may advantageously be in the shape of a circular arc. Hereby a travel path is  
10 obtained where the distance to the centre of the circular arc is constant which may facilitate the advancing of the transfer devices.

The packaging machine's means for conveying the transfer  
15 devices may advantageously consist of a pivotable carrousel to the periphery of which the transfer devices are secured. Hereby the transfer devices may readily and easily be advanced continuously simply by rotating the carrousel. Consequently the de- and accelerations are no  
20 longer necessary.

By providing the outlets of the transfer devices in such a manner that their outlet area is smaller than the area of the packaging to be advanced along the travel path,  
25 the particular advantage is obtained that all of the components will always fall into the packaging.

According to yet a convenient embodiment of the packaging machine according to the invention, the outlets of the  
30 transfer devices are arranged for displacing the packaging conveyed along this travel path. Thus it is unnecessary to use separate means of conveyance for the advancement of the packagings, and additionally it is ensured that the transfer devices and the packagings are  
35 at all times advanced at the same pace.

According to a particularly convenient embodiment of the method according to the invention, the components of a batch which is introduced into the inlets of the transfer devices are separated, and one by one or a few at a time  
5 it/they are transferred to the packaging through the outlet along at least a portion of said travel path.

Reference to the drawings

10 The invention will now be described in further detail with reference to the drawings, wherein

Figure 1 is a perspective view of an advantageous embodiment of a packaging machine according to the  
15 invention.

Detailed description of advantageous embodiments.

Figure 1 illustrates a packaging machine 1 for packaging  
20 batches of individual components 2 in a packaging 3. In the embodiment shown, the packaging machine is arranged especially for packaging nails in cardboard packagings. The packaging machine 1 comprises a centrally arranged carrousel 4 from which four radial arms 5 protrude  
25 outwardly. To each arm 5 a transfer device 6 is secured.

The packaging 3 is conveyed along a travel path 13, which has, in the area around the packaging machine 1, the shape of a circular arc which corresponds substantially  
30 to the diameter of the carrousel 4. At each end 14,15 of the travel path 13 having the shape of a circular arc, a conveyor 16,17 is arranged to deliver and remove, respectively, the packagings 3 to and from the packaging machine 1.



Each transfer device 6 consists of an inlet 7, a chute 8 and an outlet 9. The inlet 7 is arranged for receiving a batch of individual components 2 from a not shown batch dispenser and for conveying the batch to the chute 8. On  
5 the chute 8 the components 2 are separated as they are spread across a larger area, and since the chute tapers downwardly in a direction towards the outlet 9 the components are consequently conveyed one by one or a few at a time through the outlet 9 arranged for transferring  
10 the components 2 to a packaging 3 located at the outlet 9.

Preferably, the transfer device outlets 9 have an area which is smaller than the opening in the packaging 3  
15 advanced along the travel path 13. Hereby the particular advantage is obtained that all the components 2 will fall into the packaging 3.

The carrousel 4 of the packaging machine is rotatable  
20 about a central axis 10 whereby the transfer devices 6 may be caused to rotate about the central axis 10 via a not shown motor that operates the carrousel 4, and consequently they follow a circular path.

25 Somewhere along the circular path of the carrousel 4, a filling station 11 is also provided which is located at a level above the inlets 7 of the transfer devices. The filling station 11 is so arranged that its outlet is positioned above the inlets 7 of the transfer devices  
30 when the transfer devices 6 are rotated past the filling station. In the example shown the filling station 11 is a weighing machine arranged for weighing out a specific amount of nails.

35 In use, the carrousel 4 is first pivoted past the filling station 11 where components 2 are introduced into the

transfer device 6 through the inlet 7. Then the further pivoting of the carrousel 4 is synchronised with the packagings 3 along at least a portion of the travel path 13 to be traversed by the packagings. At the same time  
5 the components 2 are transferred from the transfer device 6 to the packaging 3.

Along that portion of the travel path 13 where the components 2 are transferred to the packaging 3, magnets  
10 12 are also provided on each side of the travel path 13. The magnets 12 are so arranged that they provide a magnetic field transversally to the travel path 13.

The magnetic field is arranged for paralleling the  
15 components 2.

Moreover, the magnets 12 are mutually displaced in a downward direction relative to the surface of the travel path 13 of the packagings 3 seen in the travel direction  
20 of the packagings 3. This displacement ensures that the components 2 are packed compactly whereby the packaging 3 dimensions may be reduced compared to the situation where the magnets 12 are not displaced.

25 The ends of the circular-arc travel path of the packagings 14,15 are downwardly displaced relative to that portion of the travel path 13 where the components 2 are transferred to the packagings 3. Moreover, the distance between the outlet 9 of the transfer device and  
30 the travel path 13 is such that the outlet 9 extends downwards into the packaging 3 at that portion of the travel path 13 where the components 2 are transferred to the packagings 3. Hereby it is ensured that all of the components 2 are transferred to the packaging 3. Moreover  
35 the outlet 9 will push the packagings 3 forwards whereby

the need for a separate conveyor for the packagings 3 is eliminated.

The present invention also relates to a method of  
5 packaging batches of individual components 2 in a  
packaging 3. According to the invention, a batch of  
components 2 are conveyed through an inlet 7 in a  
transfer device 6, said inlet 7 being arranged for  
10 receiving a batch of individual components 2 from a batch  
dispenser. The components 2 are subsequently conveyed  
through the transfer device 6 and out through an outlet 9  
arranged for transferring the batch to a packaging 3  
arranged at the outlet 9.

15 In this method, the transfer devices 6 are advanced  
synchronously with the packagings 3 past a filling  
station 11 where the components 2 are introduced into the  
transfer device 6 from the batch dispenser and along a  
travel path 13 where the components 2 are transferred  
20 from the transfer device 6 to the packaging 3.

In this method, the components 2 of a batch are  
separated, and separately or a few at a time they are  
transferred to the packaging 3 through the outlet 9 along  
25 at least a portion of said travel path 13.

Many modifications may be carried out without departing  
from the idea of the invention. In the embodiment shown  
the transfer device 6 is an inclined chute 8 but the  
30 transfer device 6 may for instance also consist of a  
conveyor, a vibrator or other devices arranged for  
separating the components and transferring them  
individually or a few at a time to the packaging.

35 Moreover, it should be noted that it is not a requirement  
that the travel path of the packaging is a circular-arc

path. Within the food industry the conveyance of the packaging may advantageously be linear. In that connection the transfer devices may be secured to e.g. a flexible belt conveyed around two rolls whereby the transfer devices are caused to follow, at least along a portion of their travel path, a substantially linear travel path corresponding to the travel path of the packaging. The rolls may be arranged vertically as well as horizontally.

C l a i m s

1. A packaging machine (1) for the packaging of batches of individual components (2) in a packaging (3),  
5 said packaging machine (1) comprising a number of transfer devices (6) each of which comprises an inlet (7) arranged for receiving a batch of individual components (2) from a batch dispenser, and an outlet (9) arranged for transferring the batch to a packaging (3) arranged at  
10 the outlet (9), c h a r a c t e r i z e d in that the packaging machine (1) comprises means for advancing each of the transfer devices (6) synchronously with the packaging (3) past a filling station (11) where the components (2) are introduced into the transfer device  
15 (6) from the batch dispenser and along a travel path (13) where the components (2) are transferred from the transfer device (6) to the packaging (3).

2. A packaging machine (1) according to claim 1,  
20 c h a r a c t e r i z e d in that the transfer devices (6) are so designed that the components (2) of a batch introduced into the respective inlets (7) of the transfer devices are separated and transferred to the packaging, individually or a few at a time, through the  
25 outlet (9) along at least a portion of said travel path (13).

3. A packaging machine (1) according to claim 2,  
c h a r a c t e r i z e d in that a chute (8) which  
30 inclines downwardly in a direction towards the outlet (9) is provided between each of the respective inlets (7) and outlets (9) of the transfer devices.

4. A packaging machine (1) according to one or more  
35 of the preceding claims, c h a r a c t e r i z e d in that a magnetic field (13) is provided transversally

to the travel path and along a portion of the travel path (13) of the packaging, said magnetic field being arranged for paralleling the components (2).

5 5. A packaging machine (1) according to claim 4, characterized in that the magnetic field is provided via a number of magnets (12) arranged on both sides of the travel path (13) of the packaging.

10 6. A packaging machine (1) according to claim 5, characterized in that the individual magnets (12) are downwardly displaced relative to the surface of the travel path (13) of the packagings and arranged adjacently seen in the travel direction of the  
15 packagings.

7. A packaging machine (1) according to one or more of the preceding claims, characterized in that the travel path (13) of the packaging is a  
20 circular-arc path.

8. A packaging machine according to one or more of the preceding claims, characterized in that outlet areas of the transfer devices are smaller  
25 than the area of the packaging (3) advanced along the travel path (13).

9. A packaging machine (1) according to one or more of the preceding claims, characterized in that the respective outlets (9) of the transfer  
30 devices are arranged for displacing the packaging (3) advanced along the travel path (13).

10. A packaging machine (1) according to one or more  
35 of the preceding claims, characterized in that the means of the packaging machine for advancing

the transfer devices (6) consist of a pivotable carrousel (4) at the periphery of which the transfer devices (6) are secured.

5 11. A method of packaging batches of individual components (2) in a packaging (3), wherein a batch of components (2) are conveyed through an inlet (7) in a transfer device (6), said inlet (7) being arranged for receiving a batch of individual components (2) from a  
10 batch dispenser, whereupon the components (2) are conveyed through the transfer device (6) and out through an outlet (9) arranged for transferring the batch to a packaging (3) positioned at the outlet (9),  
c h a r a c t e r i z e d in the transfer devices  
15 (6) being advanced synchronously with the packages (3) past a filling station (11) where the components (2) are introduced into the transfer device (6) from the batch dispenser and along a travel path (13) where the components (2) are transferred from the transfer device  
20 (6) to the packaging (3).

12. A method according to claim 11,  
c h a r a c t e r i z e d in that the components (2) of a batch introduced into the respective inlets (7) of  
25 the transfer devices are separated and transferred individually or a few at a time to the packaging (3) through the outlet (9) along at least a portion of the said travel path (13).

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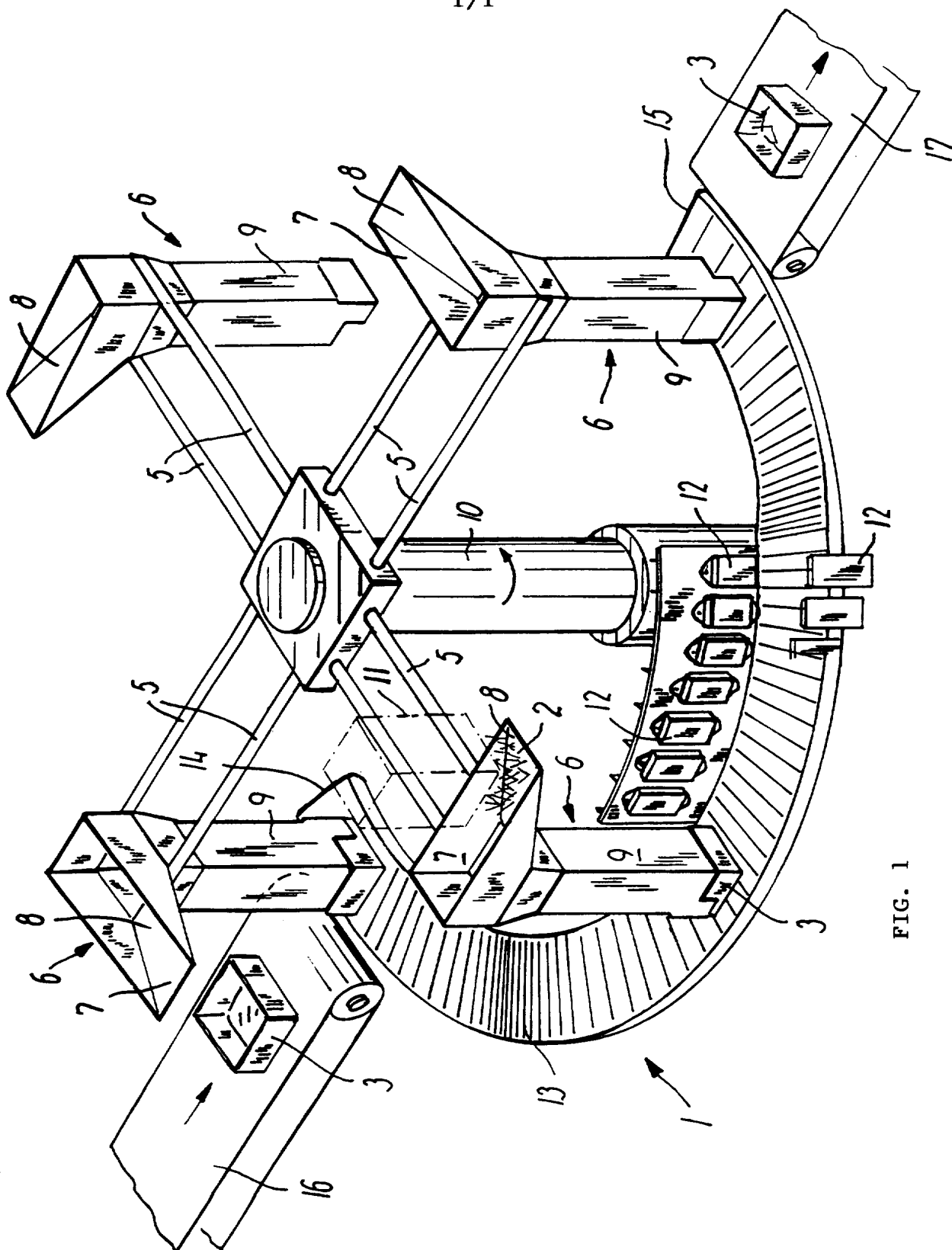


FIG. 1



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 96/00407

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65B 1/00 // B 65 B 1/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3061990 A (E.E. LAKSO), 6 November 1962 (06.11.62), column 3, line 4 - line 14, claim 1 --	1,2,3,7,10, 11,12
A	GB 2210348 A (SHIKOKU KAKOKI CO LTD), 7 June 1989 (07.06.89), figure 3 --	3,8
A	GB 1514390 A (NIPPON KOKAN KABUSHIKI KAISHA ET AL), 14 June 1978 (14.06.78) -- -----	4,5,6

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Information on patent family members

28/10/96

International application No.

PCT/DK 96/00407

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US-A-	3061990	06/11/62	NONE	
GB-A-	2210348	07/06/89	CN-A- 1032529	26/04/89
			DE-A, C- 3832383	11/05/89
			JP-A- 63309487	16/12/88
			US-A- 4877067	31/10/89
GB-A-	1514390	14/06/78	CA-A- 1053196	24/04/79
			DE-A- 2651315	23/03/78
			JP-C- 1054727	23/07/81
			JP-A- 53036394	04/04/78
			JP-B- 55048001	03/12/80
			SE-A- 7612390	15/03/78